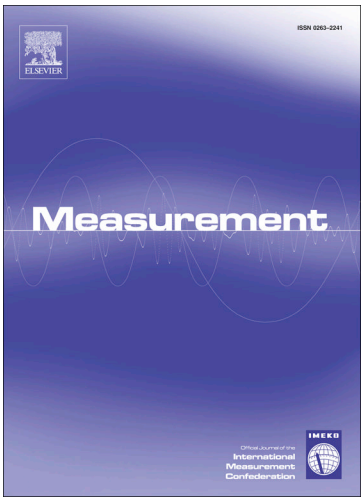

A design method for developing a high misalignment tolerant wireless charging system for Electric vehicles

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A design method for developing a high misalignment tolerant wireless charging system for Electric vehicles

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Abstract: This paper proposes a design procedure which optimizes the electrical parameters involved in the Inductively Coupled Power Transfer (ICPT) system and correlates them with geometrical dimensions of the charging coils involved for charging of electric vehicles. The Inductively Coupled Power Transfer (ICPT) system makes it possible to charge the Electric Vehicles (EVs) wirelessly at some distance to avoid safety issues and to provide convenience to the users. The ICPT system has potential applications in the field of medical sciences, office appliances, industrial loading machines, and battery charging applications. Although the ICPT system has been successful for the charging of the electric vehicles, but it retains some challenges, prominently limitation of misalignment tolerance and low efficiency of the overall circuit. The methodology presented in this paper helps in choosing appropriate dimension of the coils and electrical parameters to cope with the issue of misalignment tolerance. A program based on the mathematical model has been developed in Matlab software to determine optimal values of overall ICPT system circuit parameters and the geometrical dimensions of coils. The experiments of the ICPT system have been carried out with developed optimal coil design for 1 kW power transfer at various air gaps. The misalignment tolerance of the ICPT system has been recorded and presented in the paper. The proposed optimal design achieves maximum efficiency of 90.5% at perfect alignment,